Northwestern University Department of Physics and Astronomy

Phyx 332-0 STATISTICAL MECHANICS

Spring 2012

Syllabus

Instructor

Ian Low (Office Tech F417, Email ilow@northwestern.edu)

Course Webpage

http://www.hep.anl.gov/ian/teaching/Under_SM/Under_SM_Spring2012.html

Location and Hours

Lecture: Monday, Wednesday, and Friday 1:00 - 1:50pm, Tech M166

Monday 3:00 - 3:50am, Tech M349

Office Hours: Monday 2:00 - 3:00pm or by appointments

Course Description

Physics 332 is an introductory course on thermal and statistical physics. The goal of the course is to learn how macroscopic phenomena can be understood in terms of the relatively simple interactions of large numbers of their constitutive microscopic parts. The course is divided into three sections: introduction, thermodynamics, statistical mechanics. The introduction covers temperature, the ideal gas, entropy and the second law, a statistical definition of entropy, and multiplicity. The second part of the course examines the thermodynamic properties of solids and magnets along with free energy and the chemical potential. In particular, the Helmholtz and Gibbs free energies and their role in understanding phase transitions are presented. The third section of the course is devoted to Boltzmann and quantum statistics. Topics to be covered include partition functions, paramagnetism, equipartition, the Maxwell distribution, and Fermi-Dirac and Bose-Einstein distributions.

Required Textbook

Thermal Physics, by Danial Schroeder, Addison Wesley Longman 2000.

Exams

- In-class mid-term exam: 3:00 - 3:50pm on Monday, April 23rd.
- Final exam: 9:00 - 11:00am on Friday, June 8th.

Homework

- Assignments will be posted on the course webpage roughly every week. It is due at 1pm one week from the posted date unless otherwise noted. **NO LATE HOMEWORK WILL BE ACCEPTED**.
- You are required to work on all the assigned problems. However, only a selective number of problems will be graded.
- You are encouraged to discuss with one another about homework assignments. However, after the discussions (which I hope there are plenty!), you must solve the problem youself, write your own solutions, and demonstrate proper understanding of what you write.

Grading

Grades for the assignments and the exams will be posted on the Blackboard. Final grade will be determined by the following formula:

Homework: 35%
Mid-term exam: 30 %
Final exam: 35 %

There will be no class on the following dates:

Friday, April 6th
Friday, April 20th
Wednesday May 2nd
Friday, May 4th
Monday, May 14th
Wednesday, May 16th